

CLAIMS

I claim:

1. A microfluidic device for the detection of a target analyte in a sample comprising a solid support comprising:

- a) a sample inlet port;
- b) a sample handling well comprising a least one well port;
- c) a first microchannel to allow fluid contact between said sample inlet port and said sample handling well port;
- d) a detection module comprising:
 - i) a detection electrode;
 - ii) a self-assembled monolayer;
 - iii) a binding ligand; and
 - iv) a detection inlet port to receive said sample;
- e) a second microchannel to allow fluid contact between said sample handling well port and said detection inlet port.

2. A device according to claim 1 wherein said sample handling well and said detection electrode are on the same solid support.

3. A device according to claim 1 wherein said sample handling well is a reagent storage well.

4. A device according to claim 1 wherein said sample handling well comprises a cell handling module.

5. A device according to claim 4 wherein said cell handling well comprises a cell lysis well.

6. A device according to claim 4 wherein said cell handling well comprises a cell removal well.

7. A device according to claim 4 wherein said cell handling well comprises a cell concentration well.

8. A device according to claim 4 wherein said cell handling well comprises a cell separation well.

9. A device according to claim 1 wherein said sample handling well comprises a separation module.

10. A device according to claim 9 wherein said separation module comprises an electrophoresis module.



11. A device according to claim 1 wherein said sample handling well comprises a reaction module.

12. A device according to claim 11 wherein said target analyte is a nucleic acid and said reaction module comprises a nucleic acid amplification module.

13. A device according to claim 1 wherein said sample handling well comprises a thermal module.

14. A device according to claim 1 further comprising a pump.

15. A device according to claim 14 wherein said pump is an electroosmotic (EO) pump.

16. A device according to claim 14 wherein said pump is an electrohydrodynamic (EHD) pump.

17. A device according to claim 1 further comprising a valve.

18. A microfluidic device for the detection of a target analyte in a sample comprising a solid support comprising:

a) a sample inlet port;

b) a reagent storage well comprising an outlet port;

c) a detection module comprising:

i) a detection electrode;

ii) a self-assembled monolayer;

iii) a binding ligand; and

iv) a detection inlet port to receive said sample;

d) a first microchannel to allow fluid contact between said sample inlet port and said detection inlet port; and

e) a second microchannel to allow fluid contact between said outlet port and said detection module.

19. A method for the detection of a target analyte in a sample comprising:

a) introducing said sample to a sample inlet port of a microfluidic device comprising a solid support comprising:

i) at least one sample handling well comprising a well inlet port and a well outlet port;

ii) a first microchannel to allow fluid contact between said sample inlet port and said sample handling well;

iii) a detection electrode comprising:

1) a self-assembled monolayer;

2) a binding ligand; and

3) a detection inlet port to receive said sample; and

iv) a second microchannel to allow fluid contact between said sample handling well and said detection inlet port; and

b) detecting the presence of said target analyte.

20. A method according to claim 19 wherein said sample handling well and said detection electrode are on the same solid support.

21. A method according to claim 19 wherein said support further comprises a reagent storage well.

22. A method according to claim 19 wherein said sample handling well comprises a cell handling module.

23. A method according to claim 22 wherein said cell handling well comprises a cell lysis well.

24. A method according to claim 22 wherein said cell handling well comprises a cell removal well.

25. A method according to claim 22 wherein said cell handling well comprises a cell concentration well.

26. A method according to claim 22 wherein said cell handling well comprises a cell separation well.

27. A method according to claim 19 wherein said sample handling well comprises a separation module.

28. A method according to claim 27 wherein said separation module comprises an electrophoresis module.

29. A method according to claim 19 wherein said sample handling well comprises a reaction module.

30. A method according to claim 29 wherein said target analyte is a nucleic acid and said reaction module comprises a nucleic acid amplification module.

31. A method according to claim 19 wherein said sample handling well comprises a thermal module.

32. A method according to claim 19 wherein said solid support further comprises a pump.

33. A method according to claim 32 wherein said pump is an electroosmotic (EO) pump.

34. A method according to claim 32 wherein said pump is an electrohydrodynamic (EHD) pump.

35. A method according to claim 19 wherein said support further comprises a valve.